

DEPARTMENT OF MECHANICAL ENGINEERING

SEMINAR SERIES

Representing And Resolving Cities In The Earth System Across Scales

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Abstract

Urbanization represents one of the most significant anthropogenic changes to the Earth's surface, with profound climatic effects across scales. Many of the most pressing climate risks, including heat stress, water scarcity, extreme precipitation, and energy insecurity, are either rooted in or exacerbated by the unique built environment. Absent measures to ameliorate them, these risks will significantly intensify due to the rapid urban development coupled with climate change. An additional ~2.5 billion people are projected to reside in urban areas by year 2050. This unprecedented transformation poses immense risks to cities and their residents, but also an historic, time-sensitive opportunity to reshape how cities contribute to sustainability and climate resilience. Addressing this grand challenge, however, requires novel modeling frameworks that better resolve urban effects and their complex two-way interactions with climate across spatiotemporal scales, both for improved scientific understanding of cities and for planning effective resilient strategies. Recent advances in AI/ML, satellite remote sensing, high-resolution urban-resolving Earth system modeling, and advanced computing have enabled development of many of these advanced tools and opened up promising opportunities. In this talk, I will present how urban-resolving Earth system modeling, satellite remote sensing, AI/ML-based hybrid approaches, and advanced computing address longstanding challenges in urban climate science, from closing modeling and data gaps to projecting urban climate extremes and impacts, and how they can inform strategies for building resilient cities in a warming world.

Speaker Bio

Lei Zhao is an Associate Professor of Civil and Environmental Engineering at University of Illinois Urbana-Champaign. His research integrates theory, Earth system modeling, remote sensing, and AI/ML to advance the understanding and prediction of urban climate, impacts, and urban resilience and adaptation strategies. He is a Fellow of the American Geophysical Union (AGU) and a recipient of the AGU James B. Macelwane Medal (2025), Clarivate Highly Cited Researcher (2025), Timothy Oke Award (2023), and AGU GEC Early Career Award (2023). He received his Ph.D. from Yale University and B.S. from Nanjing University, and was a postdoc at Princeton University.

Date: Thursday, December 3, 2026
Location: Steinman 254

Time: 2:00 PM
Host: Prathap Ramamurthy

Attendance open to all interested persons

